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ABSTRACT

A guide to the economic factors that influence cable television systems is presented. Designed for local officials who must have some familiarity with cable operations in order to make optimum decisions, the guide analyzes the financial framework of a cable system, not only from the operators viewpoint, but also from the perspective of the municipality which will allow the system to operate. Basic accounting concepts and components such as capital, expenditures, depreciation, and revenues are explicitly described as they pertain to cable systems. The essential elements are presented in an illustrative example of cable costs. The information given should allow the decision makers enough data to complete a rough Pro Forma Income Statement that in turn would allow them to make reasonable estimates as to the applicability of a cable system to a particular locale. The authors emphasize, however, that without further professional analysis, the financial analysis does no more than present a realistic basis for informed discussion. (MC)

Cable Television
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Cable Economics

CABLE ECONOMICS

CABLE TELEVISION INFORMATION CENTER
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PREFACE

This document was prepared by the Cable Television Information Center under grants from the Ford Foundation and the John and Mary R. Markle Foundation to The Urban Institute.

The primary function of the center's publications program is to provide policy makers in local and state governments with the information and analytical tools required to arrive at optimum policies and procedures for the development of cable television in the public interest.

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CONTENTS

Cable Economics

I. INTRODUCTION

This is a guide to the economic factors that influence cable television systems, and presents these factors in terms of their impact on the financial vitality of a cable television system.

It is important for local officials to understand the economic implications of system design and the services proposed for a system when the community deals with franchise applicants. Conceivably, franchise applicants might not offer anything more than those services required by the Federal Communications Commission, though a financial analysis of the system's likely profitability would reveal a range of services that could be fairly demanded of the operator. Or competition for the franchise might result in the offering of a whole array of public services. An evaluation of the financial impact of these service proposals might reveal that no system could provide such services and remain financially viable. In this case, the services simply could not be provided, regardless of the system operator's promises.

Local officials who familiarize themselves with the financial dynamics of cable television will be better able to evaluate service proposals in franchise applications and determine whether an applicant can produce what he promises. They will also be better equipped to ensure that public services for which the community shares direct costs (such as programming on the local government or educational channels) do not impose unacceptable budget burdens on the community.

System operators analyze system economics in financial terms that display profit and loss. This primer explores economic factors in the same way, so that local officials can discuss service proposals with operators from a common frame of reference. It illustrates how a city might conduct a financial analysis of its own, to determine what services it will demand of franchise applicants. It is not, however, a step-by-step manual on how to conduct a financial analysis.

If the city were to analyze the financial implications of a cable system, it might logically proceed as follows:

1. Determination, through a preliminary engineering analysis, of the basic configuration of a cable system layout for the community, areas to be served, number of channels to be offered, portion of the system to be constructed underground, studio facilities, etc.
2. Development of an estimate of the financial vitality of the proposed system over a period of years, given some assumptions about services.
3. Analysis of alternative packages of public services for their impact on the system's financial vitality. Out of this process the municipality learns the true costs of each of the services it desires and is in a position to define its priorities and deal knowledgeably with franchise applicants.

For example, suppose that in addition to a basic modern cable system a given municipality envisions: a plant that is entirely underground, four program origination facilities for governmental programming, three educational program origination facilities, and free hookups at all schools and hospitals. As a result of analyzing the costs and revenues associated with these and other options, the municipality learns the following:

* An all-underground plant is prohibitively expensive and the system would lose instead of make money.
* A system built entirely above ground, using existing utility poles, apparently would be very profitable.
* The municipal government cannot afford the operating costs associated with the desired four origination facilities.
* The education system can afford the operating costs for only two origination facilities.
* If the city reduced the franchise fee, the cable system could include a mobile color studio for educational programming without affecting system profitability.
* The incremental or additional cost of hooking up the schools and hospitals does not significantly effect the profitability of the cable system.

As a result of this analysis, the municipality would probably choose an aerial system instead of an underground system. Because the municipality can estimate profitability of an aerial system, it might decide to reduce proposed monthly subscriber charges. In so doing, the municipality makes cable available to more individuals and the system operator still makes a fair return on his investment. In addition, the community might decide that it cannot afford to operate nine origination facilities. The municipality and the school system might

make more effective use of only three facilities with a mobile color studio.

Whatever its decision, the city is assured that it has not missed opportunities to make the cable television system socially useful. Financial analysis cannot eliminate uncertainty about future technical and financial development of a cable television system, nor does it exhaust the key issues the community must decide. It does, however, help city officials make intelligent choices.

II. A FINANCIAL FRAMEWORK

A. Basic Components of a Financial Analysis

Although we have discussed some reasons why a municipality should be interested in the financial feasibility of a proposed cable system, the procedure for determining the financial feasibility of a given system has not yet been defined.

This section of the primer attempts to illustrate the basic elements of such an analysis. A financial analysis of a hypothetical cable system, presented in the next section, illustrates the financial resources required in constructing and operating modern cable TV systems.

Any financial analysis undertaken to examine the economic vitality of alternative cable television systems for a given municipality involves three steps. These steps are:

1. ASSEMBLING REQUIRED DATA

The data needed to conduct a cable TV financial analysis consists of the following items:

* An estimate of the number of subscribers at the end of each year of the franchise. Some of the cost and revenue components of the financial analysis are directly related to the number of subscribers who will purchase cable service. This number can only be estimated, but an estimate is needed before the actual analysis can begin.
* An estimate of the capital costs or expenditures required to construct the cable system.
* An estimate of the operating costs required to keep the system in operation.
* An estimate of the revenues or income expected from the system.

2. EVALUATING THE FINANCIAL VITALITY OF AN ASSUMED SYSTEM

The data is assembled and analyzed in a format that permits a year-by-year projection of the system's financial performance over a period of 10 years or so. This format is usually referred to as a Pro Forma Income Statement. It combines the cost and revenue estimates with assumptions about financing and taxation, leading to a determination of the likely profitability of the assumed system as it develops.

3. ANALYZING THE FINANCIAL IMPACT OF ALTERNATIVE SERVICE PROPOSALS

Armed with the basic Pro Forma Income Statement, the analyst is in a position to change the assumptions about the rates for service, the number of origination facilities, the pace of construction, etc., and to determine their impact on the profitability estimate. When the analysis is complete, the municipality can examine the impact of its service proposals on system financial vitality, and can establish intelligent priorities.

Each of the preceding steps will be addressed in the following sections of the primer.

B. Definitions

Financial statements which are intended to portray economic effects tomorrow arising from the decision to invest money in a business today is another way of describing the Pro Forma Income Statement. It reflects the results of operations during a stated period of time and presents the revenue, capital requirements, applicable expenses and net income or loss for the period. In its simplest form, the Pro Forma Income Statement consists of the following major items:

* Capital expenditures
* Revenues
* Operating expenses
* Depreciation
* Interest
* Net income after taxes
* Cash flow
* Rate of return

Although many of these terms are well known and understood, their implication from a cable television perspective may be unclear. For this reason, we will explain each term on the basis of its financial definition and its importance in cable television financial analysis.

CAPITAL EXPENDITURES Capital expenditures are defined economically as expenditures that take several years to yield a return. Examples of capital outlays in a cable TV system are expenditures for cable and electronics, and the construction of the cable plant and the headend. The total capital expenditure is the sum required to construct the entire cable system. This money must be raised either from equity (net worth of a business), or debt, or a combination.

The cable industry is considered a capital intensive industry. One definition of a capital intensive industry is that the percentage of fixed assets (which are, essentially, the capital expenditures) to total assets is

high, ranging from 65 per cent to 80 per cent for the major system operators. By comparison, this ratio is only 41 per cent for General Motors Corp. and 35 per cent for General Electric Corp.[1]

REVENUES This is the income the operator receives. It is derived from monthly subscriber charges, charges for second TV outlets in homes, advertising charges, installation charges, charges for pay TV and other two-way services, and charges for the use of leased channels. At this time, probably over 95 per cent of total revenues are obtained from the basic monthly charge, the installation charge, and the charge for second outlets. As technology changes, and two-way systems become operational and new services become available, dependency on the basic monthly charge may decrease.

OPERATING EXPENSES Operating costs are the costs associated with the operation and management of the cable system. They are derived from three major sources: (a) operating and maintaining the cable system, (b) the preparation of locally originated programs, and (c) office and administrative expenses. These are annual recurring costs that increase as the system becomes larger and more subscribers are added.

DEPRECIATION Depreciation is an accounting concept which distributes the cost of tangible capital assets over the estimated useful life of the unit in a systematic and rational manner. Depreciation for the year is the portion of the total charge under such a system that is allocated to the year. This allows some provision for future replacement of equipment.

INTEREST Interest is the money paid for the use of capital on a loan of money and becomes part of the debt. Unless otherwise specified, it is assumed that the interest charge is based upon simple, as opposed to compound, interest and is calculated in the following manner:

Annual Interest Charge = Interest Rate x Amount of Unpaid Loan

NET INCOME AFTER TAXES A system's profitability, because of complex laws and accounting rules, can be measured and interpreted in a number of ways. One such measure, shown in the Pro Forma Statement, is defined:

Net Income After Taxes = Total Revenue - Total Operating Expenses - Interest - Taxes - Depreciation

Under the new Federal Communications Commission rules, which suggest that construction be completed within five years, high capital expenditures will be required for those first five years. Although these capital expenditures are depreciated over a longer time than the construction period, the amount of depreciation written off in the early years of a system's life, combined with increasing operating expenses, will generally make the net income of a cable system negative. Net income, because of high depreciation and low revenues in the early years of operation, is a poor measure of profitability for cable TV systems.

CASH FLOW Cash flow is the total amount of cash generated by a business within a specified time period. It is usually interpreted as the ability of a business to pay its bills or meet its basic money commitments. Because cash flow does not involve capital expenditures and repayment of debt, if this amount is positive, the system is generating enough revenue to pay its operating expenses and interest on its loan. The higher the cash flow, the more economically viable the system is.

Cash Flow = Net Income + Depreciation

If, at any given point, a measure of the system's liquidity (which refers to a firm's ability to meet maturing obligations) is desired, the borrowing and repayment of loan schedules must be added to cash flow.

RATE OF RETURN A rate of return measures the "interest" that would accrue to a businessman by investing in a business opportunity. Because rate of return in an interest-like indicator of the attractiveness of an investment over time and takes into consideration the time-value of money, it is one of the strongest indicators of system profitability. For modern cable systems, the typical rate of return, calculated on an after-tax basis, is in the neighborhood of 15 per cent to 25 per cent.

The reason rate of return is important is that it determines if the capital needed to start a business will return more to the investor if it remains in a bank earning interest or is invested in municipal bonds. If the investment returns more than the interest that would accumulate from these two sources, the investment is considered worthwhile.

Many corporations usually set a floor limit on the rate of return; they will not invest in a project unless its rate of return is higher than this floor. For example, Alcoa Corp., General Electric Corp. and General Motors Corp. require a minimum of 20 per cent (after taxes) rate of return for new investments.[1]

[1] Jules J. Bogen, ed., *Financial Handbook* (New York, Ronald Press Co., 1968), p. 17.3.

[1] Ezra Solomon, *The Theory of Financial Management*, (New York: University Press, 1969), p. 34.

All of tnese financial measures must be determined in order to realistically assess the viability of a proposed cable television system. For this reason they are included in the basic analysis of cable investments. Although the dollars that are estimated for each definition may vary greatly, depending upon the system being analyzed, the basic definitions always remain the same.

Having defined the content and form of the financial instrument, the final step involves determination of which elements of a cable system are required to completely estimate capital expenditures, operating costs and revenues. One way of determining these elements is to specify or define the process of building and operating a cable television system. This specification process, which results in a list of the essential cost-related elements of a cable system, is shown in Table 1.

TABLE 1

ESSENTIAL ELEMENTS OF A CABLE SYSTEM

A. Number of Subscribers
- Primary subscribers
- Number of subscribers with second outlet
- Number of subscribers who disconnect

B. Capital Expenditures
- Headend
  - tower and antennas
  - electronics
- Distribution system
  - cable and electronics
  - construction
- Subscriber drops
  - cable and electronics
  - construction
- Test equipment, tools and spare parts
- Cablecasting equipment
- Furniture, fixtures and improvements

C. Revenue
- Service income (monthly service charge income)
- Installation income
- Advertising income
- Leased channel, pay TV or other income

D. Operating Expenses
- Service costs
  - salaries, wages and benefits
  - maintenance
  - pole and site rentals
  - light, heat, power
  - microwave service
  - rent
  - others
- Origination expenses
  - salaries, wages and benefits
  - maintenance
  - rent
  - technical services
  - films, sets and props
  - others
- General, selling and administrative expenses
  - franchise fee
  - salaries, wages and benefits
  - light, heat and power
  - vehicles
  - rent
  - dues, contributions, stationary, supplies
  - etc.

III. CABLE COSTS, REVENUES AND ECONOMICS: AN ILLUSTRATIVE EXAMPLE

The exact process of estimating the costs and revenues of a proposed cable system requires detailed technical and construction specifications, an analysis of potential customers, an analysis of the signals that are available off-the-air, an analysis of the signals to be carried on the cable system and other elements. Rather than replicate this entire process in the primer, this section will concentrate on how these costs are developed. Some basic cost relationships will be identified and typical ranges in costs for selected items will be shown.

To give a more substantive feeling about the financial implications of a cable TV system, a hypothetical example has also been included in this section. The purpose is first, to show the magnitude of the dollars involved in constructing and operating a typical modern cable system[1] and second, to show how all the previously discussed components of a financial analysis tie together.

A detailed and exhaustive financial analysis is a time consuming process. Many cable operators and research organizations have bypassed hand calculations by developing detailed computer programs which perform all the detailed calculations. The estimates shown in this example have been derived from one such model.

An example involves the analysis of a proposed cable system for a suburb of a hypothetical major city. This suburb called Cabletown, has a population of 63,000 and is inside one of the top 100 television broadcast

[1] The estimates for the number of subscribers, capital and operating costs and revenues have been derived from two major sources: Park, Rolla Edward. *Prospect for Cable in the 100 Largest Television Markets.* Santa Monica, Calif., The Rand Corporation, October 1971, R-857-MF. (Penetration and Number of Subscribers); and Weinberg, Gary. *Cost Analysis of CATV Components.* Bethesda, Md., Resource Management Corporation, June 1972. UR-170 (Capital and Operating Costs, Revenues).

markets. The residents of Cabletown currently receive the following "off-the-air" signals:[1]

Networks—3 VHF Signals
Network Duplicates—2 UHF Signals
Independents—3 UHF Independents
Educational—1 UHF Signal, 1 VHF Signal

The proposed cable system will carry all these signals plus two additional independent stations. The town's cable television ordinance contains the following requirements:

* Monthly service charge—$6
* System must be completely built in four years
* Monthly charge for a second outlet—$1
* Installation charge—$5
* Reconnect charge—$5
* Franchise fee—three per cent of gross revenues

An engineering consultant has recommended the following system:

* Single cable system
* Twenty-four channel capacity with two-way capability[2]
* Home converter
* Length of plant is approximately 200 miles
* No underground construction required—cable system will be installed on telephone poles
* A single studio for public access will be sufficient

[1] The number of off-the-air signals received in Cabletown is, of course, hypothetical. This total number, which is higher than might be expected in real situations was selected merely to illustrate the type of signals that might be available.

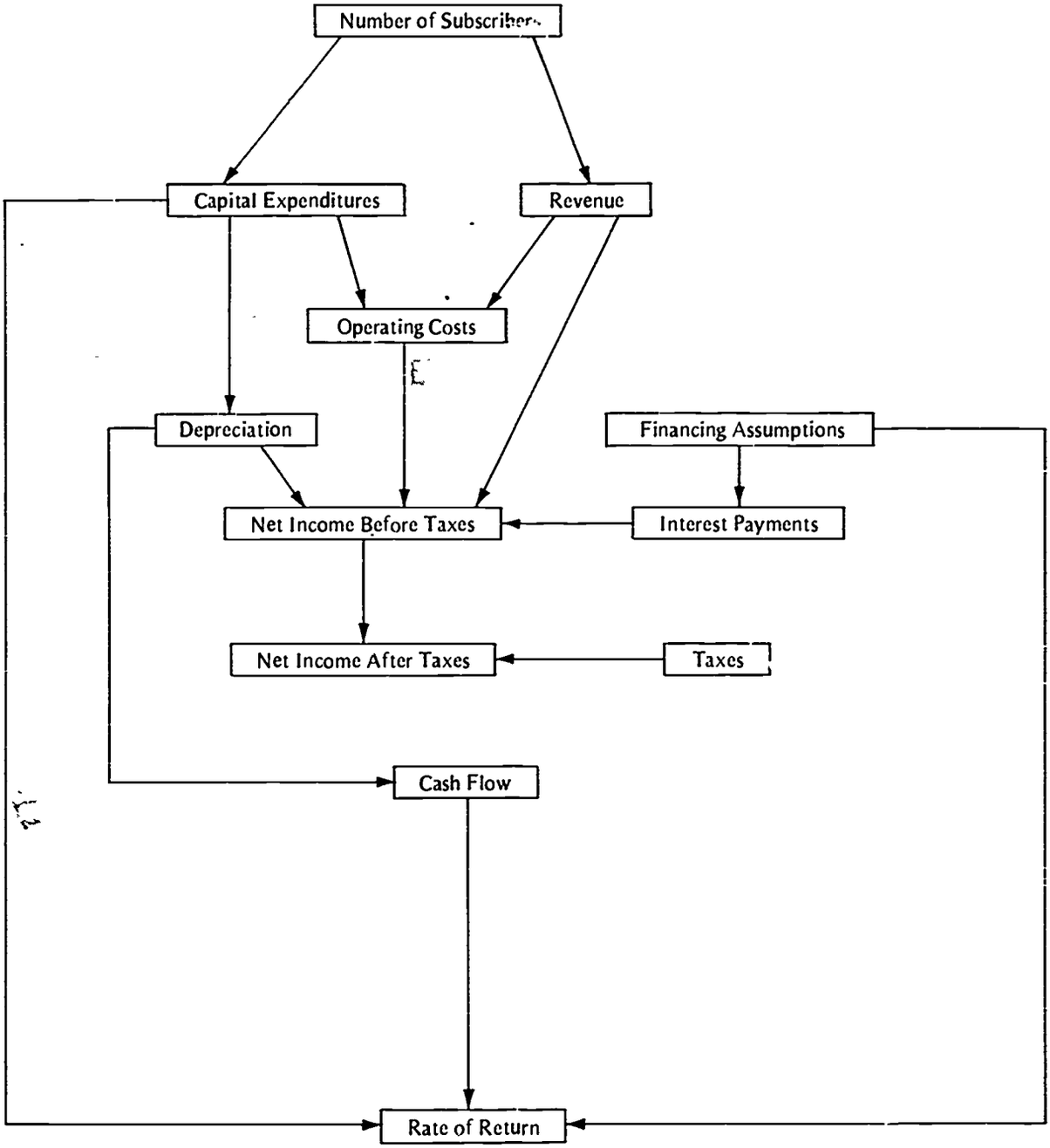
[2] The Federal Communications Commission requires as a minimum, a 20 channel capacity for new cable systems within the top 100 TV markets. For each off-the-air or microwave signal carried on the cable the system must provide an additional nonbroadcast channel. Since 12 off-the-air and microwave imported signals are being carried, the total capacity would be 12 X 2 or 24 channels.

Although more information than this would be required for a thorough financial analysis, certain assumptions have been made. These assumptions include additional engineering information such as site and type of required cable, amplifier type, spacing of amplifiers, etc., and additional economic information such as sales tax rate, interest rate on borrowed money and a borrowing and repayment loan schedule. For the purpose of this example, these assumptions reflect either typical industry experience or "educated guesses."

The exact sequence in which the estimates are determined is critical to the development of a thorough analysis. For example, one of the elements of capital expenditures is subscriber equipment costs (which include home converters, etc.). Since subscriber equipment costs can only be calculated when the number of subscribers is known, the determination of the number of subscribers must preceed the estimation of capital expenditures. In a similar manner, the franchise fee, which is considered to be an operating cost, is based upon gross revenues. Thus, the determination of revenues must be made before operating costs can be calculated.

The proper sequence for defining cable financial estimates is shown in Figure 1.

FIGURE 1
THE SEQUENCE OF A CATV
FINANCIAL ANALYSIS



A. Number of Subscribers

The key to the success of any cable system is its penetration—the percentage of homes passed by the cable system that subscribe to the service. Although a number of techniques ranging from intuition to detailed econometrics forecasting methods have been used, all these techniques have a high degree of uncertainty or risk. In all these approaches, five factors tend to be important in estimating the number of subscribers:

* Annual service charge
* Off-the-air signal quality (the poorer the signal quality, the higher the penetration)
* The number of signals carried on the cable (the more signals carried, the higher the penetration)
* Percentage of homes with color TV sets (the more homes with color TV, the higher the penetration
* Median family income

For new systems within the top 100 markets, because of FCC rules limiting the number of signals that can be carried on the cable, estimates of penetration run from about 35 per cent to about 55 per cent of homes passed.

In our example, we have calculated both the penetration and number of subscribers. These are shown below.

YEAR	Penetration(%)	Number of Subscribers
1	0.3	720
2	15	3095
3	25	4987
4	36	7125
5	38	7615
6	40	8120
7	43	8630
8	45	9160
9	48	9680
10	51	10215

This high estimate of penetration arises because in our example the quality of off-the-air signals is low, the number of signals carried on the system is high, and the number of homes with color TV sets is high.

On the average, about 15 per cent of the subscribers would be expected to have a second outlet and about 15 per cent of the total number of subscribers in any year might be expected to discontinue service in the following year.

B. Capital Expenditures

1. HEADEND EQUIPMENT

The typical range of costs for headend components is shown in the following table:

Item	Cost or Range
Tower	$12,000-30,000
Building	$ 2,000- 8,000
VHF signal processor and antenna	$ 2,750 per channel
UHF signal processor and antenna	$ 3,250 per channel
Microwave equipment	$ 5,400 per channel
Studio processing equipment	$ 1,500 per channel
FM equipment	$ 1,600
Common equipment	$ 5,500- 6,700

For Cabletown, the total capital expenditure for headend equipment is $81,823.

2. DISTRIBUTION SYSTEM

The distribution system exhibits the highest possible variation in capital costs of any cable television component. This variation results not from the cost of cable and electronics but because of the almost infinite construction possibilities. For example, if the cable distribution system must be underground, the cost of burying this cable varies as a function of soil conditions, number of cables and whether a conduit is required. Although the cost of cable and electronics may vary from $2,000 per mile to $6,000 per mile, the cost of burying the cable may vary from $2,000 per mile to $50,000 per mile.[1]

The following table highlights this variation:

Item	Cost Variation/Mile
Trunk cable and electronics	$ 4,000- 6,000
Feeder cable and electronics	$ 2,000- 3,000
Aerial construction (single cable)	$ 2,500- 3,000
Aerial construction (dual cable)	$ 3,300- 3,800
Burying cable in asphalt (without conduit)	$ 6,000-25,000
Burying cable in concrete (with conduit)	$15,000-50,000
Burying cable in sand	$ 3,500- 7,000

Comparing the cost of aerial construction with that of concrete construction, the cost implication of requiring underground construction is obvious.

[1] The density of homes within a given municipality is another factor that must be considered in estimating distribution costs. As the density increases, the number of available subscribers per mile of cable increases, and the cost per subscriber decreases.

For example, if a 200-mile cable system is required and the choice is either all aerial or a complete underground system in concrete, the maximum cost differences between these two alternatives might be:

* Aerial 200 miles X 2,500 = $500,000
* Concrete 200 miles X 50,000 = $10,000,000

This difference has a major impact on the financial feasibility of any proposed cable system. In fact, if the requirement for underground construction could be reduced by five to 10 miles, the "savings" would be sufficient to buy all the headend equipment. Thus, the trade-off between construction requirements, financial vitality and additional services to the municipality is very real and very important. The system for Cabletown required all aerial construction and the capital costs for the distribution system amounts to $1,163,936.

3. SUBSCRIBER DROP EQUIPMENT

The costs associated with subscriber drop equipment parallel those associated with distribution system equipment. If the cable system plant must be underground, then the drop cable running from the plant to the subscriber's home must also be underground. While the variation in cable and electronics costs was small for the distribution system, the cost of drop related equipment, as the following table shows, is quite large:

Item	Per Subscriber Cost
Single cable with converter	$48
Single cable without converter	$18
Dual cable with converter	$63
Dual cable without converter	$33
Underground construction	$34-100
Aerial construction	$ 4- 8

As was the case with distribution costs, the trade-off between construction requirements, financial vitality and additional services is significant.

The following table presents the annual subscriber drop costs for Cabletown:

YEAR	Subscriber Costs ($)
1	37715
2	124510
3	98815
4	111420
5	25120
6	25725
7	26330
8	26600
9	26840
10	26950

4. OTHER CAPITAL COSTS

The remaining capital costs are estimated on the basis of total headend and distribution costs, number of subscribers, or sophistication of desired origination equipment. These are as follows:

Item	Cost
Inventory and spare parts[1]	One per cent of the headend distribution costs
Test equipment[1]	One per cent of the headend distribution cost
Furniture and leasehold improvements[1]	$5,000-25,000 (depends on number of subscribers)
Cablecasting equipment (per studio)[1]	$10,000-100,000

By specifying the level of sophistication required for public access origination equipment (black and white vs. color, mobile facilities, etc.), local officials can easily determine the capital cost impact of requiring more than one studio. In most cases, the total dollar figure involved for these items is not very significant. This could easily change if the number and sophistication of access studios were high. For Cabletown, the following cost estimates were obtained:

Test equipment, tools and spare parts	$17,350
Furniture and leasehold improvements	$13,625
Cablecasting equipment	$75,000

5. TOTAL CAPITAL COSTS

To reiterate, the capital costs of a cable system are usually dominated by the construction requirements. For an underground system, the construction costs may be significantly higher than the costs derived from all of the other capital equipment. Cabletown requires capital expenditures of approximately $1.8 million (obtained by adding items B 1-4). For larger systems that require underground plants—especially in urban areas—capital expenditures would be significantly higher.

[1] Although these items may be purchased over the life of the franchise, it is usually assumed, for computational efficiency, that they are one-time costs and are purchased in the first year of operation.

One estimate places the capital expenditures at approximately $35 million for wiring half of Manhattan Island.[1]

C. Revenues

Estimating annual revenues for contemporary cable TV systems is a very straightforward process. The annual revenue is obtained from two sources:

* Service income
* Installation income

The amount of revenue that may be expected for future cable systems is harder to predict. Because no operational system has complete two-way or pay TV capabilities, and because the use of advertising on cable is still in its infancy, there is no historical information from which predictions can be developed. For the present time, "best guesses" are the only source of information.

1. SERVICE INCOME

Annual service income is estimated in the following manner:

Annual Service Income = Annual Service Charge X Annual Number of Subscribers + Annual Second Outlet Charge X Number of Subscribers with Second Outlet

For Cabletown, service income grows from $53,000 in the first year of operation to $750,000 in year 10.

2. INSTALLATION INCOME

The annual installation income can be estimated in the following manner:

Annual Installation Income = Installation Charge X New Subscribers

In our example, this runs from a low of $4,000 to a high of $16,000.

3. OTHER REVENUE SOURCES

The following table presents some basic estimates of revenue that might be expected from other cable services. The table is highly speculative but it shows the possibilities of revenue growth in a modern cable system. These services represent the most immediate potential revenue growth in cable and should not be neglected in a financial analysis. It is possible that the revenue sources will grow faster than most estimates show.

Service	Cost Relationship[2]
Pay Movies	35% of all basic subscribers—$1 per mo.
Alarm Systems	20% of all basic subscribers -$1 per mo.
Advertising Revenues	Depends on number of subscribers. For a 10,000 subscriber system this might amount to $100,000 to $300,000 per year or approximately $10 to $30 per subscriber per year.

D. Operating Expenses

1. SERVICE COSTS

These costs arise because of the need to maintain the cable system at some specific level of performance, pay for the rental of poles (if applicable), hook up new subscribers and disconnect old ones.

About 50 per cent to 70 per cent of these costs are for wages, salaries and benefits of employees. The remaining costs are for repairs, maintenance and operation of the cable system (including parts and supplies), poles and tower rentals, truck repairs, etc.

Because the exact determination of annual service costs are based upon many factors (length of system, number of new subscribers, age of system, etc.) no single equation can be developed for estimating service costs. For a system the size of Cabletown, the annual service costs, derived from a series of equations, range from $200,000 to $300,000 per year. The amount increases as the system becomes older because equipment begins to wear out. As the system size increases, the service cost increases.

2. ORIGINATION EXPENSES

The cost of producing locally originated cable TV programs depends upon the number of hours of programming produced annually.

The major component of this expense is the payroll: wages, salaries and benefits account for approximately 75 per cent of the annual origination costs. Operating supplies (tapes, tubes, lights and repairs), rent, transportation and sales expenses account for the remaining 25 per cent.

The cost of producing one hour per week of local programming is approximately $2,500 per year.[3] To estimate the annual cost of producing a greater amount of local programming, this cost estimate should be multiplied by the number of hours of programming desired per week.

The potential amount of money spent on origination (both capital and operating expenses) could

[1] Paul Kagan Associates, Inc., *Cablecast*, April 1, 1972.

[2] Paul Kagan Associates, Inc., *Cablecast*, February 1, 1972.

[3] Charles Tate, ed., *Cable Television in the Cities*, (Washington, D.C., The Urban Institute, 1971), p. 34.

be very large. When examining the possibility of multiple origination facilities, municipal officials should not neglect the annual operating costs associated with these facilities. This is especially important under current FCC rules whereby the municipality and local education authority program their own local origination channels and must pay for these origination expenses.

In our example, we have assumed that eight hours of operator supported programming are developed each week. The annual origination expenses for Cabletown are approximately $20,000 per year.

3. GENERAL SELLING AND ADMINISTRATION (GSA) EXPENSES

These expenses include all of the necessary office functions needed to run a business, including the wages, salaries and benefits paid to bookkeepers, clerks and secretaries; the rental of office space; the purchase of supplies and services; the payment of property and sales taxes; the payment of franchise fees; and other miscellaneous office expenses.

The largest single GSA expense is the franchise fee. Assuming a three per cent gross revenue fee, the franchise fee usually amounts to 20 per cent of annual GSA expenses. Other major costs include personnel costs, billing and bookkeeping costs, and bad debts.

As was the case with service expenses, no single equation can be developed for estimating GSA expenses. For a system of Cabletown's size, these expenses are between $100,000 and $150,000. This amount increases annually as more subscribers are added to the system.

4. TOTAL OPERATING EXPENSES

The total annual operating expenses for Cabletown (obtained by adding items D 1-3) run from a low of $340,000 in year one to a high of $470,000 in year 10. Although we have calculated the annual operating expenses for our hypothetical example, it is difficult to show how this amount would vary for other systems. Because these operating costs consist of many elements, each of whose costs must be calculated independently, no standard rules of thumb can be derived.

The service expenses are about 60 per cent of the total operating expenses, the GSA expenses are about 33 per cent of the total, and the origination expenses about seven per cent of the total. Unless the amount of programming changes over time, these percentages will remain essentially the same over the life of the system.

E. Other Information

In analyzing Cabletown, we have assumed a conventional profit-making form of ownership. The system owner is financing the capital investment through his own funds (equity) and through borrowing (debt). Two-thirds of the capital investment ($1.2 million) is obtained from loans at an average interest rate of eight per cent. Equipment is depreciated over a six to 10 year life.

The analysis only examines the first 10 years of operation. Although the franchise length may be longer than 10 years, developing estimates beyond a 10 year horizon is generally not recommended because of technical and financial limitations and uncertainties. The system under consideration might be technically or operationally obsolete within 10 years and thus require a major rebuilding program. While it is difficult to predict the state of cable technology 10 years hence, it is almost impossible to predict the capital expenditures required to rebuild or modernize the system. In addition, the effects of inflation and other fiscal measures reduce the value and worth of projections that far in the future to almost zero.

F. The Complete Pro Forma Statement

All the major components of the Pro Forma Income Statement have either been calculated or sufficient information exists to fill in the missing blanks. Using the basic form discussed earlier with the estimates derived for Cabletown, it is now possible to illustrate a complete representative Pro Forma estimate. This is shown in Figure 2.

It has been assumed that the system is constructed over a four year period with 25 per cent of the construction being completed each year. This accounts for the high capital expenditures in years one through four. The total capital expenditures of $1.8 million is representative of a modern cable system of the size of Cabletown. For urban cable systems, with a requirement for total underground construction, the capital expenditures could easily double or triple.

The growth in revenue, which reflects the increase in the number of subscribers over time, reaches a peak in year 10. The net income, which from our earlier definition measures the difference between revenues, expenses, depreciation and interest, is negative for the first nine years of operation. The fact that it is negative should not imply that the system is unprofitable. Heavy losses, because of the high capital requirements, might be expected in the early years. If construction were completed in one year, the depreciation charges in the later years would be reduced and net income might become positive earlier.

Cash flow from operations is a more meaningful measure of vitality in the cable industry than net in-

FIGURE 2
CABLETOWN PRO FORMA INCOME STATEMENT

YEAR	1	2	3	4	5	6	7	8	9	10
SUBSCRIBERS	718	3095	4987	7125	7615	8120	8633	9156	9684	10215
CAPITAL EXPENDITURES	515563	412603	387803	400399	25104	25765	26313	26739	27035	27196
REVENUE	57170	242633	381254	541878	570212	607811	646197	685192	724606	764241
OPERATING EXPENSES	341126	301454	339912	388973	381767	398934	420922	438280	457667	476215
DEPRECIATION	58057	107426.	152660.	194210.	198394.	202688.	200944.	185131.	173500.	159797.
INTEREST PAYMENTS	48000	96000	96000	96000	96000	96000	96000	96000	96000	48000
NET INCOME	-202806	-136368	-104686	-71398	-55093	-46702	-37267	-17793	-1331	41718
CASH FLOW FROM OPERATIONS	-144749.	-28942	47974	122811	143301	155986	163676	167337	172169	201516

come. It is defined as the ability of the system to meet its annual money commitments, which are operating expenses and interest on loans. The higher the cash flow, the more economically viable the system is.

The final and most commonly used measure of economic vitality is the rate of return on equity. For the most cable systems, the typical after tax rate of return is in the neighborhood of 15 per cent to 25 per cent. One of the major problems in determining the economic measures of vitality, especially rate of return, is that we assume the world is certain and all of the projections and forecasts are perfectly accurate. But uncertainy does exist, for example, in the estimates of the number of subscribers and in the cost of underground construction, and these uncertainties should be considered in the final analysis. A number of techniques exist for evaluating the risks introduced because of uncertainty; they are valuable because they give more accurate information on which an intelligent decision can be made. For example, without considering uncertainity, we might calculate the rate of return on equity as 15 per cent for Cabletown. By utilizing uncertainty techniques, we discover that instead of a 100 per cent chance of making this 15 per cent, we actually have only about a 65 per cent chance of making 15 per cent rate of return. A probability attached to the rate of return enables the decision maker to make a more accurate and realistic assessment of the financial viability of the system.

The rate of return is influenced by the construction schedule required by the municipality. All other things being equal, if the completion time is extended (five years instead of four, for example) the rate of return will be higher. Conversely, if the completion time is reduced, the rate of return will be lower.

IV. CONCLUSION

In an attempt to give a brief description of the financial analysis of cable television systems, this guide deliberately understates a number of important considerations. One is the role of preliminary engineering analysis. Before a community can undertake the financial analysis of a cable television system suitable to local needs, it must develop the basic engineering description of the system. This can be done with city resources, by consulting firms, or even by potential franchise applicants. But such an analysis must precede financial evaluation of services.

A more important consideration is that financial analysis is only one of the foundations for intelligent decisions about cable television. Careful development of the legal framework for local regulation, and thoughtful procedures for community involvement in the decision process are important elements of a successful effort to mold cable television to community needs. Financial analysis does no more than present a realistic basis for informed discussion.